Amendments to the Specification:

Please replace paragraph **[0039]**, with the following amended paragraph:

[0039] A conventional regenerative fuel cell system, for example, as disclosed in U.S. Patent 5,376,470 is shown in Figure 1. The regenerative fuel cell system comprises a fuel cell 112 including an anode for receiving hydrogen and a cathode for receiving oxygen, an electrolyzer 116 for electrolyzing water to produce pure hydrogen and pure oxygen, storage tanks 124, 126 to respectively store hydrogen and oxygen, and water storage tank 114 communicating with said fuel cell 112 and the electrolyzer 116. The fuel cell 112 is located above the water storage tank 114 while the electrolyzer 116 is located below the water storage tank 114. Hydrogen is supplied to the fuel cell 112 during fuel cell mode or extracted from the cathode side of the electrolyzer 116 during electrolyzer mode via a hydrogen line 128 that is connected to the hydrogen storage tank 124 and through a liquid-gas separator 122. A flow valve ~~122~~120 and a secondary water storage tank 118 are provided, for humidifying the hydrogen stream. Similarly, oxygen is supplied to the fuel cell 112 via lines 130 and 115 and through the water storage tank 114 during fuel cell mode or extracted from the anode side of the electrolyzer 116 via oxygen line 130 and 117 and through the water storage tank 114. In the electrolyzer mode, the oxygen generated flows up to the water storage tank 114 and then bubbles up to the fuel cell via line 115 if the fuel cell is in the fuel cell mode or to oxygen storage means 126 via line 130 if the fuel cell is not operating.

Please replace paragraph **[0045]**, with the following amended paragraph:

[0045] Similarly, the electrolyzer portion 30 is shown to include only one electrolyzer cell. In this embodiment, a conventional structure of electrolyzer cells is described by way of example, and in many ways this corresponds to the structure of the fuel cells. Each electrolyzer cell comprises an anode bipolar plate 31, a cathode bipolar plate 32 and a membrane electrode assembly (MEA) 33 sandwiched between the anode 31 and cathode 32. The MEA 33 has a proton exchange membrane (PEM) 34. The anode bipolar plate 31 is provided with a flow field 35 on the front face thereof for introducing

water to one side of the membrane 34 for reaction. On the rear face of the anode bipolar plate 31, an air bypass flow field (not shown) is provided for the air used in fuel cell reaction to bypass the electrolyzer portion. The cathode bipolar plate 32 is also provided with a flow field 35 on the front surface thereof for conducting the hydrogen through the electrolyzer portion 30 to the fuel cell portion 20 (either generated in the electrolyzer reaction or to be used in the fuel cell reaction from external storage means). It is to be understood that in an electrolyzer stack comprising a plurality of electrolyzer cells, the air bypass flow field is formed by the rear face of the anode plate of one cell and the rear face of the cathode plate of an adjacent cell abutting against this anode plate. Either the rear face of the anode plate or the rear face of the cathode plate (or both) may be provided with flow channel to form the flow ~~filed~~field while the other face is smooth.

Please replace paragraph **[0048]**, with the following amended paragraph:

[0048] In the present invention, the fuel cell portion 20 and the electrolyzer portion 30 are preferably stacked together. Therefore, only one end plate is needed between the two portions, which, as noted above, is the common separator plate 40. As can be seen in Figure 2b~~c~~, the end plate 80 of the fuel cell portion 20 has four ports each communicating between the internal flow fields of the fuel cell portion 20 and outside pipelines or conduits to allow process gases and coolant to flow through, specifically, a fuel cell hydrogen outlet 50, an electrolyzer hydrogen outlet 51, a fuel cell air outlet 52 and a water inlet 53. The end plate 70 of the electrolyzer portion 30 has three ports communicating between the internal flow fields of the electrolyzer portion 30 and outside pipelines, specifically, a fuel cell hydrogen inlet 60, an air inlet 62 and a water outlet 63. Similarly, on the separator plate 40, there are provided three ports corresponding to the three ports of the electrolyzer end plate 70 to communicate between the fuel cell and electrolyzer portions on opposite sides of the separator plate 40, specifically a hydrogen port 41, an air port 42 and a water port 43. On the end plates 70, 80, the ports are adapted to connect to pipes or conduits as well as valves or switches. On the separator plate 40, the ports are preferably in the form of through

holes with necessary seals provided around them. It is to be understood that the relative position sequence of the anode and cathode bipolar plates in either fuel cell portion or electrolyzer portion may be different and this will not affect the operation of the regenerative fuel cell system of the present invention. In other words, the bipolar plate immediately adjacent the separator plate 40 in the fuel cell portion 20 may be either an anode bipolar plate or a cathode bipolar plate. Likewise, the bipolar plate immediately adjacent the separator plate 40 in the electrolyzer portion 30 may be either an anode bipolar plate or a cathode bipolar plate.

Please replace paragraph **[0049]**, with the following amended paragraph:

[0049] The various ports for fuel cell and electrolyzer portions 20,30 have been described above as being, an "inlet" and "outlet". However, it is to be appreciated that in general flows of the various fluids may be reversed as between the fuel cell and ~~electrolyte~~electrolyzer modes; alternatively, or as well, for some modes of operation, while flow directions for a fluid may be the same in both electrolyzer and fuel cell modes, the flow direction could be different from that described. Accordingly, the ports can be identified, more generically as follows. First, on the end plate 70 for the electrolyzer portion 30, the ports 60, 62 and 63 can be considered as a first electrolyzer cathode port 60, a first gas bypass port 62 and a first electrolyzer anode port 63. The port 62 is designated as a "bypass port", since the oxidant is considered to "bypass" the active area of the electrolyzer cells. For the end plate 80, the ports 50, 51, 52 and 53 can be considered as: a first fuel cell ~~cathode~~anode port 50; a third fuel cell ~~cathode~~anode port 51; a first fuel cell cathode port 52; and a first coolant port 53; the port 51 is designated as a third port, as it is, in some senses, optional depending upon the configuration for extracting hydrogen during electrolysis, and the designation of the second port is reserved for the hydrogen or ~~cathode~~anode port at the other end of the fuel cell portion.

Please replace paragraph **[0050]**, with the following amended paragraph:

[0050] The middle or separator plate 40~~14~~ then has the three ports 41, 42 and 43, which provide second ports for both the fuel cell portion and the electrolyzer portion, as follows: port 41 provides a second cathode port of the electrolyzer and a second anode port of the fuel cell portion; port 42 provides a second air or gas bypass port of the electrolyzer portion and a second cathode port of the fuel cell portion; port 43 provides a second anode port of the electrolyzer portion and a second coolant port of the fuel cell portion.

Please replace paragraph **[0056]**, with the following amended paragraph:

[0056] Figure 3b illustrates the air flow when the regenerative fuel cell system runs in the fuel cell mode. As can be seen in Figure 3b, ambient air, or other suitable oxidant, first enters the electrolyzer portion 30 from an air supply means, usually a compressor, a blower or a fan (not shown), via the fuel cell air inlet 62 on the electrolyzer end plate 70 and flows to an air inlet port of the air bypass flow field of the anode bipolar plate 31 of each electrolyzer cell, provided adjacent one end on the rear side of each anode bipolar plate 31. The air flows from the air inlets, crosses the air bypass flow fields of the electrolyzer cell and reaches the air outlets of the air bypass flow fields, adjacent the opposite ends of the anode bipolar plates 31, on the rear side of the anode bipolar plate 31 of each electrolyzer cell (Figure 5a). In practice, when the regenerative fuel cell system switches from electrolyzer mode to fuel cell mode, passing the air through the relatively hot electrolyzer cells will be sufficient to heat the air up to the fuel cell operating temperature which is critical for proper fuel cell operation; once the fuel cell has been operating for some time, it will be sufficiently hot that upstream pre-heating of the air is not essential. Then the air exits the air bypass flow field of each electrolyzer cell via the air outlet and leaves the electrolyzer portion 30 without any reaction via the air port 42 provided on the separator plate 40. In this embodiment, as is known in the art, the fuel cell air inlet 62 on the end plate 70 is in alignment with the air inlets of the air bypass flow fields on the rear sides of the anode bipolar plates 31. Likewise, the air port 42 on the separator plate 40 is in alignment with the air outlets of

the air bypass flow fields on the rear sides of anode bipolar plates 31, the air bypass flow fields collectively providing an air bypass conduit.

Please replace paragraph **[0070]**, with the following amended paragraph:

[0070] Reference will now be made to Figures 5a and 5b, which show respectively the operation of the regenerative fuel cell apparatus of the present invention in a fuel cell mode and an electrolyzer mode. For simplicity and clarity, in Figure 5, the fuel cell and electrolyzer portions 20, 30 are shown schematically, to indicate flows and to indicate flows between different sections of the apparatus. Additionally, in Figure 5, the bipolar plates 21, 22 and 31, 32 are indicated, for one cell in each of the fuel cell portion 20 and the electrolyzer portion 30. Also, while the plates 21, 22, 31, 32 are indicated as being bipolar in the sense that, in general, each plate will abut a plate of the opposite polarity in an adjacent cell, the plates, 21, 22, 31, 32 can more generally be considered as flow field plates.

Please replace paragraph **[0077]**, with the following amended paragraph:

[0077] As another embodiment, the separator plate 40 in the first embodiment or the insulator plate 28' in the second embodiment is preferably provided with a valve, e.g. a ball valve 90 as shown in Figure 8a and 8b, and this valve 90 can be internal within the separator plate 40. Here, the hydrogen port 41 is shown having a first hydrogen port 41a in communication with the cathode outlets of the cathode flow fields 35 of the electrolyzer cells and a second hydrogen port 41b in communication with the anode inlets of the anode flow fields 25 of the fuel cells. Then, the ball valve 90 is shown connected to first and second hydrogen ports 41a, 41b and also to a line 92 connected to a hydrogen storage tank. In the electrolyzer mode of the regenerative fuel cell system, the valve 90 may be in a first position to permit the electrolyzed hydrogen to flow from the electrolyzer portion 30, i.e. from the first hydrogen port 41a, to an external hydrogen storage device. When the system switches from electrolyzer operation to fuel cell operation, the valve 90 switches to a second position, permitting hydrogen to flow between the first and second hydrogen ports 41a, b, i.e. to flow from the electrolyzer

portion 30 to the fuel cell portion 20 in the same way described above. As known in the art, in the electrolyzer portion 30, water is carried across the membranes from the anode to the cathode during electrolysis, and is subsequently entrained in the cathode flow fields by the evolved hydrogen. This port arrangement prevents the water entrained in the generated hydrogen from entering the fuel cell portion 20 and hence flooding the fuel cells. Known separators and the like can be used to separate water out, upstream of a hydrogen storage tank or the like. As can be appreciated by those skilled in the art, the switch mechanism may alternatively be provided internally of the separator plate 40, namely in the hydrogen port 41.